1998
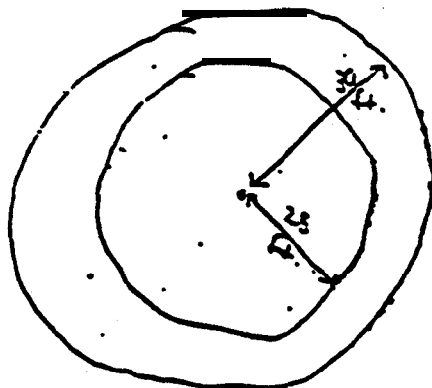
HIGH SCHOOL

MATHEMATICS

ANCHOR PAPERS

SESSION 1

1.

The **outer ring of horses on** the merry-go-round is 30 feet **from the center.** **The inner ring is 25 feet from the center. If you** are on the outer ring and your friend is on the inner ring, what is the difference in distance **traveled** by you and your friend after tie **merry-go-round** completes **15 revolutions?** Provide the **work** that **shows** how you arrived at your answer,

$2(3.14)30 =$

$2(3.14)25 =$

$C = 2\pi r$

outer ring $= 188.4$ ft.

inner ring $= 157$ ft.

$\underline{or} = 15(188.4) = 2826$ ft.

$\underline{ir} = 15(157) = -2355$ ft.

471 ft.

Difference is $\boxed{471}$ ft.

Correct answer

Correct and complete process
-correctly calculates circumference of inner **and** outer rings
-multiplies both circumferences by **15** rotations
-subtract& to find difference in **distance** traveled

Exemplary Response I

Session 1

1 | The outer ring of horses on the merry-go-round is 30 feet from the center. The inner ring is 25 feet'from the center. If you are on the *outer ring* and your friend is on the inner ring, what is the difference in distance traveled by you and your friend after the merry-go-round completes 15 revolutions? Provide the work that shows how you arrived at your answer.

$$3.14$$
$$\times\ 60$$
$$.000$$
$$1884$$
$$188.40$$
$$\times\quad 15$$
$$194200$$
$$18340$$
$$2826.00$$

$$3.14$$
$$\times\ 50$$
$$00.0$$
$$1570$$
$$157.00$$
$$\times\qquad 15$$
$$00000$$
$$15700$$
$$1570.00$$

$$2826.00$$
$$-1570.00$$
$$1256.00$$
← **Subtracts to find difference in distance traveled**

$$\boxed{1256.00\ ft}$$ ← **Incorrect answer**

Error in computation
−157 × 15 = 2355 not 1570

Student correctly *finds* circumference of inner and outer rings (188.4 and 157)

Correct Process;
Error in Computation

11

The outer ring of horses on the merry-go-round is *30* feet from the center. The inner ring is 25 feet from the center. If you are on the **outer ring** and your friend is on **the** inner **ring,** what is the difference in distance **traveled** by you and your friend after the merry-go-round completes **15** revolutions? Provide the work that shows how you arrived **at** your answer.

$$C = 2\pi r \qquad\qquad C = 2\pi(30)$$

$$C = 188.4 \times 15 = 2826 \, ft.$$

$$C = 2\pi(25)$$

$$157 \times 15 = 2355 \, ft$$

$$\begin{array}{r} 2826 \\ - 2335 \\ \hline 491 \, ft \end{array}$$

*Correct process
-student finds correct distance
of inner and outer rings*   I

*Recopying error
—subtracts 2335
(instead of
2355) from 2826*

491ft. is the difference in distance.

Incorrect answer I

**Correct Process;
Recopying Error**

SESSION 1

1 The outer ring of **horses on** the **merry-go-round** is **30** feet from the center. **The inner-ring is 25 feet from the** center. If **you** are on the outer ring and your friend is on the inner ring, what is **the** difference in distance **traveled by you and your friend after** the merry-go-round completes **15 revolutions?** Provide the work that shows how you **arrived** at your answer.

30   25
x15   x15
150   135
30   25
450   375
-375
75

The difference is
75 ft

> **Incorrect answer**

> **Incorrect process**
> **—student does not use**
> **equation for circumference**

SESSION 1

(2)

You are going to be at the amusement park from 10 A.M. to 4 P.M. **and** will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in line, and riding the ride.

RIDETIMES

Ride	1	2	3	4
Time (in minutes)	18	24	14	20

Based on **the** average ride time for the first 4 rides, what is the **maximum** number of rides you can go on during the hours you are at the paik? **Provide** the work that shows **how.you** arrived at your answer.

$$18 + 24 + 14 + 20 = \frac{76}{4} = 19 \text{ min per ride}$$

10 a.m. to 4 p.m. is 6 hours minus 30 min is 5 hrs & 30 min.

330 min divided by 19 min is 17.368

answer = 17 rides

Correct answer

Go On

Exemplary Response | Session 1

SCORE 1

[2]

You are going to be at the amusement park from 10 A.M. to 4 P.M. and will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in line, and riding the ride.

RIDE TIMES

Ride	1	2	3	4
Time (in minutes)	18	24	14	20

Based on the average ride'time for the first 4 rides, what is the maximum number of rides you can go on during the hours you are at the park? Provide the work that shows how you arrived at your answer.

$$\text{Average Time} = \frac{18 + 24 + 14 + 20}{4} = 19 \text{min.}$$

(10 Am through 4 P.M.) – 30 min:

6 - 30 = 5 hrs. or 30 min =

5·60 + 30 =

300 + 30 = 330 min

Correct process — student finds correct average and divides 330 by 19

$$\frac{330 \text{ min}}{19 \text{ min}} = \boxed{15 \text{ rides}}$$

Incorrect answer — 330 ÷ 19 ≈ 17 *not 15*

Go On

Session 1

44

2

You are going to be at the amusement park from 10 A.M. to 4 P.M. and will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in line, and riding the ride.

RIDE   TIMES

Ride	1	2	3	4
Time (in minutes)	18	24	14	20

Based on the average ride time for the first *4* rides, what is the **maximum** number of rides you can go on during the hours you are at the park? Provide the work that shows how you arrived at your answer.

10 to 4

6 hrs

6 hours = 360 min

$$\begin{array}{r} 18 \\ 24 \\ 14 \\ 20 \\ \hline 76 \text{ min} \end{array}$$

$4\overline{)76} = 19$ min per ride

$19\overline{)360} = 18.95$

19 rides

Correct process
—student finds correct average
(19 min.) and divides

Incorrect   answer
—½ hour lunch time not **accounted** for **in figuring** total time
-360 ÷ **19** (instead of 330 ÷ 19)

Session 1

188141
45

[2]

You are going to be at the amusement park from 10 A.M. to 4 P.M. and will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in line, and riding the ride.

RIDE TIMES

Ride	1	2	3	4
Time (in minutes)	18	24	14	20

Based on the average ride time for the first 4 rides, what is the *maximum* number of rides you can go on during the hours you are at the park? Provide the work that shows how you arrived at your answer.

.30
24
14
18
20
─────
106 min

76
x 4
─────
60)304
     ι
5.06 hrs

76
x 5
─────
380

6 hrs   (18 rides)

Incorrect answer

106   166   x 5
x 4   x 3   ─────
       ───   530
       ⅗¹⁸

5.3 hrs

14

Incorrect process
--student does not figure 330 minutes total ride time
—attempts guess and check using 76 minutes and/or 106 minutes

Go

3

On Fun Fridays, **prizes** and discounts are **given** away to the first **300 people** who enter the amusement park. Every 6th person who enters the park gets a coupon for a free ride on the Twister, and every **14th** person receives a 10% discount on any food they buy that day. Of the **first 300 people** who enter **the** park on Fun Friday, how many **will receive** both a free ride coupon *and* a 10% discount on food? Provide the work that shows how **you** arrived at your answer.

Correct process *--indicates* 42 as the least *common multiple* *-divides 300 by 42*

6 12 18 24 30 36 |42|

14   28 |42|

$$\frac{300}{42} = 7 \text{ sets of matche}$$

⑦ | Correct answer |

(Exemplary Response)

| 3 |

On Fun **Fridays,** prizes and discounts are **given** away to the first 300 **people who** enter the amusement park. Every 6th person who enters the park gets a coupon for a free **ride** on the Twister, and every 14th person receives a 10% discount **on** **any food they buy that day. Of the first 300 people who enter the park on** Fun Friday, **how** many **will** *receive* both a free ride coupon **and** a 10% discount on food? Provide the work that shows how **you** arrived at your answer.

$$14 \overline{)300} 21.428571$$

.21 10% discents

> *Incorrect process*
> *—divides 14 into 300*

7 will recieve both a coupon + a 10% discont

> *Correct answer*

3

On Fun Fridays, prizes and'discounts are **given** away to the first 300 **people** who enter the amusement park. Every 6th person who **enters** the park gets a coupon for a free ride on the Twister, and every 14th person **receives** a 10% discount **on** any food **they** buy that day. Of the first 300 **people** who enter the park on Fun Friday, how many will *receive* both a free ride coupon **and** a 10% discount **on** food? Provide the work that shows how you arrived at your answer.

SCORE 0

$$\frac{50 \text{ people receiving coupons}}{6 \overline{)300}}$$

$$\frac{21}{14 \overline{)300}} \text{ recieving 10\% discount.}$$

Incorrect process
— divides 14 and 6 into 300
and adds the quotients

$$\begin{array}{r} 50 \\ +21 \\ \hline 71 \end{array} \text{ people reciece both.}$$

Incorrect answer

49

Session 1

4 A parking lot near the amusement park charges *$2.00* for the first hour and $0.50 for each **additional half** hour. Write an equation that you could use to **calculate** the parking fee **(F)** based on the **number** of hours **(h)** you spend at the amusement park.

$$F = ^\$2 + ^\$1(h-1)$$

Correct *equation* *for finding parking fee* **(F)**

Using your equation, how much **will** you pay **the** parking attendant for $6\frac{1}{2}$ hours **of parking** time? Provide the work **that** shows how you arrived at your **answer.**

$$F = 2 + 1(6.5-1)$$

Correct solution for **F** *where* **h** *is 6.5*

$$= 2 + 5.5$$

$$\$7.50$$

$$F = 7.5$$

Correct *process* *for calculating* **F** *using* *student's equation*

Go

Exemplary Response *(Three Components)*

4

A parking lot near **the amusement** park **charges $2. 00** for the **first hour** and **$0.50** for-each **additional** half **hour.** Write **an equation** that you could use to calculate the parking fee **(F)** based on the number of hours **(h)** you-spend at the amusement park.

$$ \_F = \$2.09 + \$.50(h-1) $$

> *Incorrect equation*
> *-student does not **multiply** $0.50 by 2 to get the hourly rate*

Using your equation, how much **will** you pay the **parking** attendant for $6\frac{1}{2}$ hours of 'parking time? Provide the work that shows how you arrived at your answer. ,

$$ F = \$2.09 + \$.50(6.5-1) $$

*Appropriate solution for **F** where **h** is 6.5*

$$ \$4.75 $$

Correct process *for calculating **F** bused on student's equation* **--student's equation is** *correctly applied*

Appropriate Solution Using Incorrect Equation

4

A parking lot near the amusement park charges *$2.00* for the fir&hour and **$0.50** for each **additional half** hour. Write an equation that you could use to calculate the **parking fee (F)** based on the number of hours **(h)** you-spend at the amusement park.

$$F = \$2.09 + \$.50\,(h-1)$$

> *Incorrect equation*
> *—student does not multiply $0.50 by 2 to get the hourly rate*

Using your **equation,** how much **will** you pay the **parking** attendant for $6\frac{1}{2}$ hours of 'parking time? Provide the work that shows how you arrived at your answer. ,

$$F = \$2.09 + \$.50\,(6.5-1)$$

*Appropriate **solution for F where h is 4.5***

$$\$\,4.75$$

Correct process** for **calculating** F based on student's **equation
*-student's equation is **correctly** applied*

Appropriate Solution Using Incorrect Equation

A parking lot near the amusement park charges $2.00 for the first hour and $0.50 for each additional half hour. Write an equation that you could use to calculate the parking fee (*F*) based on the number of hours (*h*) you spend at the amusement park.

2.00 first hour
$ .50 = additional hour

$$F + h = ?$$

Incorrect equation for F

Using your equation, how much will you pay the parking attendant for $6\frac{1}{2}$ hours of parking time? Provide the work that shows how you arrived at your answer.

5-1   -5½ - 4.
$2.00 $.50 $.50 $.50 $.50 $.50 $.50 $.50 $.50 $.50 $.50
/   - ½ - ½ - ½ - ½ - ½ = ½ ½ - ½ ½ - ½ ½

$7.50

Process does not use equation

Correct solution for F

One Component

SESSION 1

4 A parking lot near the amusement park charges $2.00 for the first hour and
$0.50 for each additional half hour. Write an equation that you could use to
calculate the parking fee (*F*) based on the number of hours (*h*) you spend at
the amusement park.

> *No equation*

Using your equation, how much will you pay the parking attendant for $6\frac{1}{2}$ hours
of parking time? Provide the work that shows how you arrived at your answer.

Is+ hr = 2.00
2nd hr = 1.00
3rd hr = 1.00
4th hr = 1.00
5th hr = 1.00
6th hr = 1.00

7.00# for $6\frac{1}{2}$ hours of
parking time

*Incorrect **solution** for F where* **h** *is* **6.5**

Incomplete process for calculating **F**
—student finds fee for 6 hours, not 6½ hours

54
138630

SESSION 1

5 Ryan, Tracy, Scott, and Chris were discussing the order in which they should use the ramp. If only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

RTSC
RSTC
RTCS
RSCT
RCTS
RCST

6 diffrent ways for each per
x4 diffrent people
24 possible combinations

Correct and complete process
-shows **6** possibilities beginning with *Ryan*
-multiplies **6** possibilities by **4** people

Correct answer

Exemplary Response

55

5 Ryan, Tracy, Scott, and Chris were discussing the order in which they should use the ramp. If only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

R T S C
R T C S
R S T C
R S C T
R C S T
R C T S

24 different combinations

Correct answer

Incomplete process
—does not show 6 possibilities
× 4 people

139322

Go On

5 Ryan, Tracy, Scott, and Chris were discussing. the order in which they should use the ramp.- if only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

6 x 4

24

Correct answer

6 × 4 is not a sufficient process

5 Ryan, Tracy, Scott, and Chris were discussing the order in which they should use the ramp. If only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

R =
T =
S =
C =

R, T, S, C,
T, S, C, R
S, C, T, R
C, T, R, S
R, S, C, T
R, C, T, S
T, R, S, C
T, C, R, S
S, T, R, C
S, R, T, C
C, S, R, T
C, R, S, T

Incomplete list

(12)

Incorrect answer

Directions

Use this table to do Numbers 3 and 4.

**RYAN'S
PRACTICE *RESULTS**

Week	Runs
1	1
2	3
3	7
4	13
5	21
6	31
7	43
8	57

Completes table correctly

6 Over the last 6 weeks Ryan has been trying to increase the number of times he can skateboard from the top of one side of the ramp to the top of the other and back without stopping. The table shows his results for the first 6 weeks.

If Ryan continues to improve in Weeks 7 and 8 at the same rate as shown in the table, how many successful runs can he expect each week? Provide the work that shows how you arrived at your answers.

$$31 + 12 = 43$$

$$43 + 14 = 57$$

Indicates correct pattern in table and in work space

Exemplary Response

Go On

*D*irections
Use this table to do Numbers 3 and 4.

RYAN'S
PRACTICE RESULTS

| Week	Runs
1	1
2	3
3	7·
4	13·
5	21
6	31
7	43
8	5 2

Completes table correctly

6

Over the last 6 weeks Ryan has been trying to increase the number of times he can skateboard from the top of one side of the ramp to the top of the other and back without stopping. The table shows his results for the first 6 weeks.

If Ryan continues to improve in Weeks 7 and 8 at the same rate as shown in the table, how many successful runs can he expect each week? Provide the work that shows how you arrived at your answers.

Pattern is not clearly or correctly explained

Went into a pattern 2 every

43, 57

Directions

Use this table to do Numbers 3 and 4.

RYAN'S
PRACTICE RESULTS

Week	Runs
1	1
2	3
3	7
4	13
5	21
6	31
7	43
8	58

1.5
2.3
3.2
4.2
5.1
6.1
7.2

$5f = 21$

Pattern is incorrect

*Incorrectly completes table
—43 is correct, but 58 is not*

6

Over the last 6 weeks Ryan has been trying to increase the number of times he can skateboard from the top of one side of the ramp to the top of the other and back without stopping. The table shows his results for the first 6 weeks.

If Ryan continues to improve in Weeks 7 and 8 at the same rate as shown in the table, how many successful runs can he expect each week? Provide the work that shows how you arrived at your answers.' ,

43 | 58

— Go On

Session 1

7 Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.

—6 feet—
—18 inches—
7.5 ft —at least 100 feet—
Start
Finish
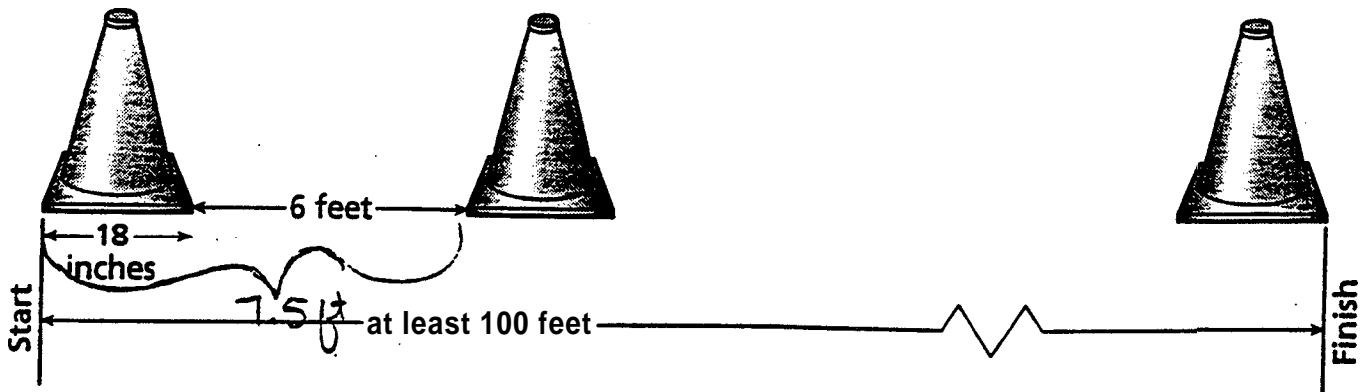
If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the minimum number of cones required to make a course that is *at least* 100 feet *long?* Provide the work that shows how you arrived at your answer.

18 inches = 1.5 feet

6 + 1.5 = 7.5

$\frac{100}{7.5} = 13\frac{1}{3}$

14 × 7.5 = 105 + 1.5 = 106.5
cones   end cone

15 cones

Correct number of cones

Correct and complete process -divides 100 ft by 7.5 ft, rounds to 14 cones, and adds end cone

Exactly how many feet long will the course be?

14 × 7.5 = 105 + 1.5 = 106.5

106.5 feet

Correct number of feet

Exemplary Response

7 Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.

—6 feet—
—18— inches
Start
at least 100 feet
Finish
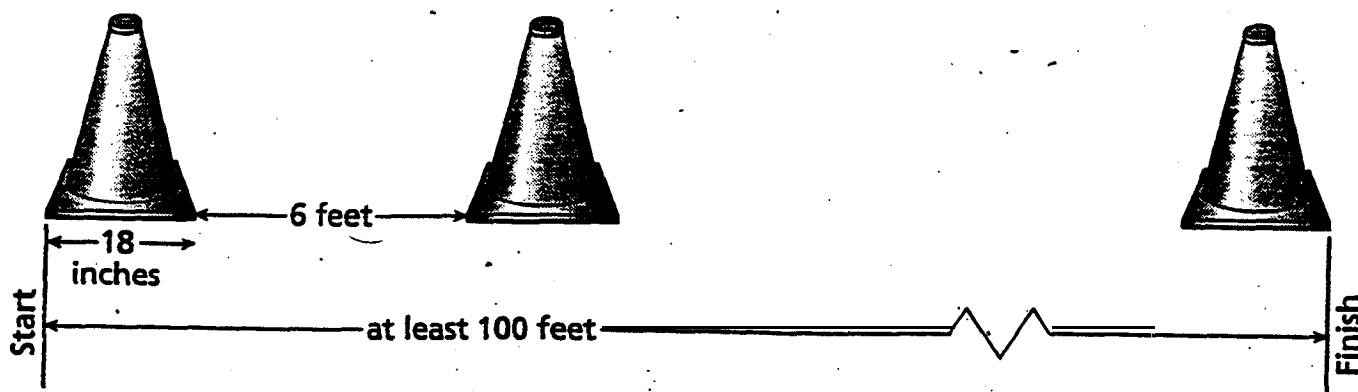
If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet' apart, what is the *minimum* number of cones required to make a course that is. *at* least 100 feet long? Provide the work that shows how you arrived at your answer.

15 cones

Correct number of cones

No process shown

Exactly how many feet long will the *course* be?

106.5 feet

Correct number of feet

Two Components

Session 1

7 Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.
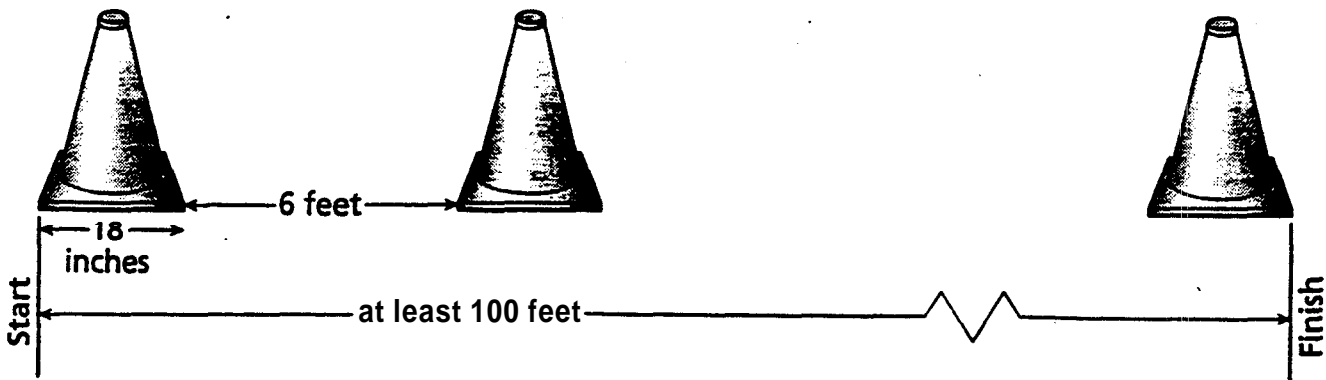
If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the *minimum* number of cones required to make a course that is at least 100 feet long? Provide the work that shows how you arrived at your answer.

$$18 - 12 = 6$$
$$1\tfrac{1}{2} \text{ ft}$$
$$6x + 1\tfrac{1}{2}x = 100$$
$$7\tfrac{1}{2}x = 100$$
$$13\tfrac{1}{3}$$

14 cones

Incorrect number of cones

Incomplete, but sufficient, process -equation implies the division process, "100 ÷ 7½"

Exactly how many feet long will the course be?

$$14(1\tfrac{1}{2})$$
$$21$$
$$6(14)$$
$$21 + 84$$

Incorrect number of feet

$$105 \text{ ft}$$

One Component

110219

Go On

SESSION 1

7

Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.

If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the *minimum* number of cones required to make a course that is *at* least 100 feet long? Provide the work that shows how you arrived at your answer.

18"

```
   1 6 :
 6 ) 100
     6
    4 0
    3 6
    4
```

```
   3 6
 x 6
  96
```
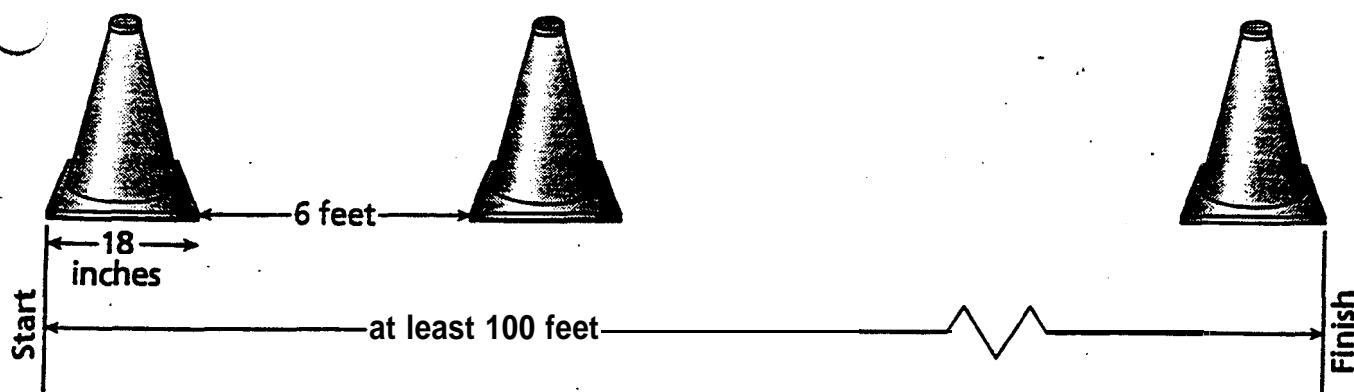
Incorrect process —divides 100 feet by 6 rather than by 7.5 ft.

36 Cones

1.5   6   1.5   6   1.5   6   1.5   6   1.5

31.5   35   8 · 5   6   1.5   8
87.5

Exactly how many feet long will the course be?

95 feet

Incorrect number of feet

Go- On

1998

HIGH SCHOOL

MATHEMATICS

ANCHOR PAPERS

S E S S I O N   2

Telephone Rates

Directions

Show all of your work and write your answers directly in this booklet.

1. John and his family recently moved. His famiiy asked him to help recommend a telephone company that offers the least expensive long-distance rates.

   John contacted several teiephone companies and has narrowed the choice to National Telex and Dial-Direct, Inc. The rates for the two companies are shown below.

TELEPHONE COMPANY RATES

| | National Telex | | Dial-Direct, Inc. | |
	First minute	Each additional minute	First minute	Each additional minute
Daytime	$0.46	$0.18	$0.30	$0.20
Evening	$0.40	$0.15	20% off daytime	20% off daytime
Weekend	60.35	$0.12	30% off daytime	30% off daytime

$$NT = 0.35 + 0.12(n-1)$$
$$DD = 0.7(0.30 + 0.20(n))$$

Indicates **two** *correct equations* ***for finding cost***

Go C

1 John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

cost/min

	National Telex	Dial-Direct
one min	$0.35	$0.21
	$0.47	$0.35
	$0.59	$0.49
	$0.71	$0.43
	$0.83	$0.77
	$0.95	$0.91
	$1.07	$1.05
eight min	$1.19	$1.19
	$1.31	$1.33
	$1.43	$1.47
	$1.55	$1.61
	$1.67	$1.75
	$1.79	$1.89
14 min	$1.91	$2.03

*Includes a table **correctly** comparing the rates —10 minute cost **comparison is correct** —indicates same cost ($1.19) at 8 minutes*

*Writes a correct **recommendation***

. Because the family speaks an average of 10 min on the phone (long distance), I would recommend that they use National Telex. Although it is more expensive on shorter calls, in 8 minutes National Telex becomes less expensive. It suits this family's needs. ~~STO~~ Go

*The response **fully** addresses the performance event -Effectively communicates all process **components** (with no flaws)*

SESSION 2

Telephone Rates

Directions

Show ail of your work and write your answers directly in this **booklet**

1. John and his family recently moved. His family asked him to help recommend a telephone company that offers the least expensive long-distance rates.

    John contacted several telephone companies and has narrowed the choice to National Telex and Dial-Direct, Inc. The rates for the two companies are shown below.

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	National Telex		Dial-Direct, Inc.	
	First minute	Each additional minute	First minute	Each additional minute
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Evening	$0.40	$0.15	20% off daytime	20% off daytime
Weekend	$0.35	$0.12	30% off daytime	30% off daytime

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

1 — John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

N.T.

14
.9 x .12
.35 + = 1.43

Correctly solves for 10 minute costs using appropriate equations
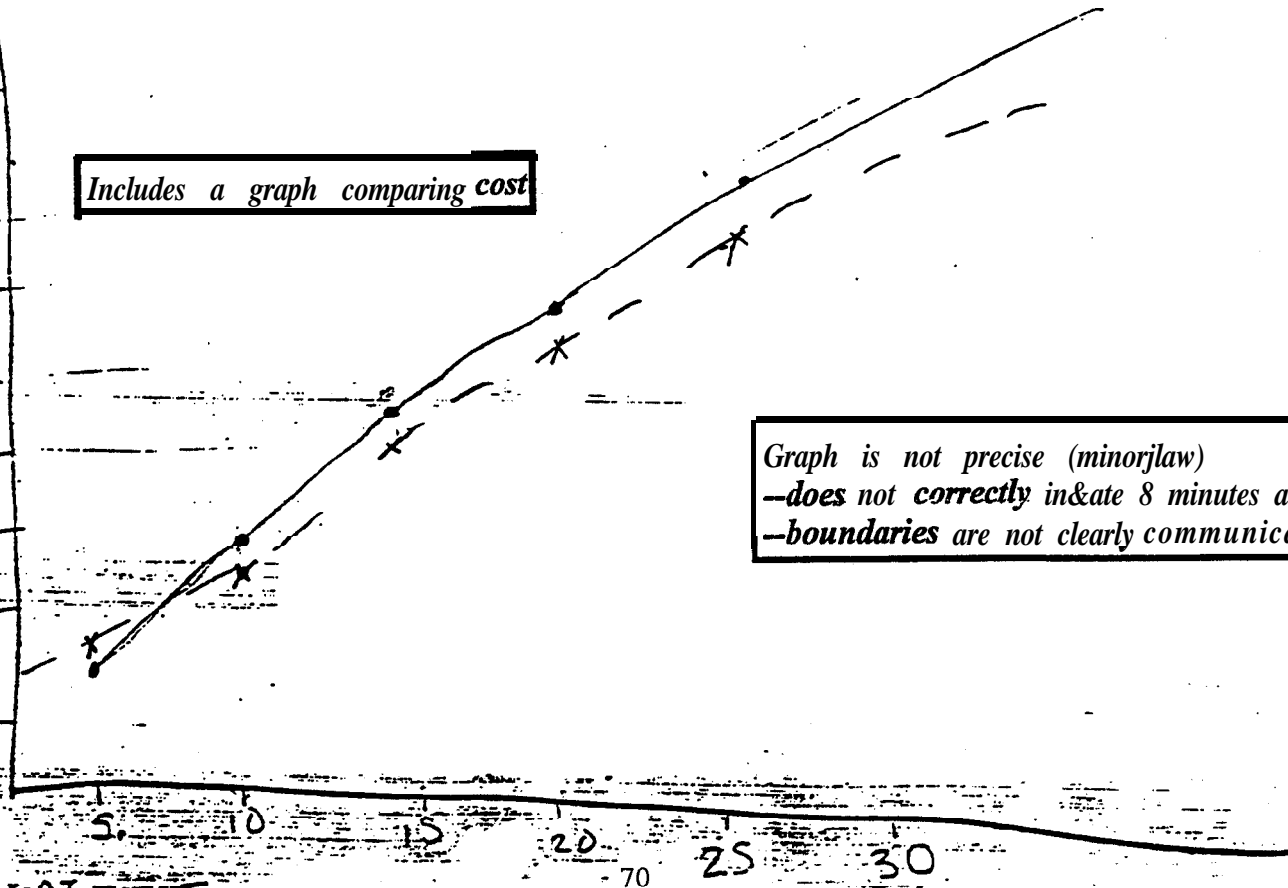
D.T.

.21 + 9 x 14
.24
+ .21
= 1.47

7 min - same amount
N.T. Cheaper

States that at 7 minutes the charge would be the same (minor flaw)

Writes a minimal recommendation

Includes a graph comparing cost

Graph is not precise (minor flaw)
—does not correctly in&ate 8 minutes and $1. 19
—boundaries are not clearly communicated

70

SESSION 2

The response substantially addresses the performance ever.
-Communicates most process components
-Contains minor flaws

Telephone Rates

Directions
Show all of your work and write your answers directly in this booklet

1. John and his family recently moved. His family asked him to help recommend a telephone company that offers the least expensive long-distance rates.

John contacted several telephone companies and has narrowed the choice to National Telex and Dial-Direct, Inc. The rates for the two companies are shown below.

TELEPHONE COMPANY RATES

	National Telex		Dial-Direct, Inc.	
	First minute	Each additional minute	First minute	Each additional minute
Daytime	$0.46	$0.18	$0.30	$0.20
Evening	$0.40	$0.15	20% off daytime	20% off daytime
Weekend	$0.35	$0.12	30% off daytime	30% off daytime

John's family ma&es most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., and when each company would charge the same amount.

71

Session 2
184937

1 John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., and when each company would charge the same amount.

P = price   x = number of minutes

National Telex

$0.35 + (0.12)x = P$

Includes a table and equations

1 minute	2	3	4	5	6	7	8	9	10	11	12	13	14
0.35	.47	.59	.71	.83	.95	1.07	1.19	1.31	1.43	1.55	1.67	1.79	1.91

Dial-Direct

$0.21 + (.14)x = P$

Correctly solves for 10 minute costs

1 minute	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0.21	0.35	0.49	0.63	0.91		1.19		1.47		1.75	1.89	2.03	2.17	

0.77   1.05   1.33   1.61

Correctly states when costs are equal

at eight minutes The price is The same

72
184937

STOP

SESSION 2

Telephone F&es

Directions

Show ail of your work and write your answers directly in this booklet.

1. John and his famiiy recently moved. His family asked him to help recommend a telephone company that offers the least expensive long-distance rates.

John contacted severai telephone companies and has narrowed the choice to National Telex and Diai-Direct, Inc. The rates for the two companies are shown below.

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Weekend	S0.35	$0.12	30% off daytime	30% off daytime

John's famiiy makes most of their long-distance caiis on the weekends, and each call averages 10 minutes.

Use the *weekend* rates shown in the table to write a'recommendation that John would present to his famiiy to choose a particular company. Your recommendation should include a graph, tabie, or equations showing what length of phone caii would cost the least at National Telex, the least at Dial-Direct, Inc., and when each company would charge the same amount.

Session 2
122916

1 John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would. cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

National telex

Dial Direct

10 min — $1.43

5 min — $ .83

1 min. — $ .35

10 min — $1.47

5 min — $ .77

1 min — $ .21

Includes a comparison of cost below ten minutes

$1 min = $.35$

$3 min = \$.12 \times 5 + \$.35$

$10 min = \$.12 \times 9 + \$.35$

$1 min = \$.30 - .30 \times .30$

$5 mins = .56 + .21$

$10 mins = 1.26 + .21$

Correctly solves for ten minute costs using appropriate equations

*The response **does** not include
-Solution indicating that 8 minutes is when each company charges the same amount
--Recommendation of National Telex*

*The response partially addresses **the performance** event
--Communicates some _process components*

STC

Telephone Rates

Directions

Show all of your work and write your answers directly in this booklet

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John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose 'a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., and when each company would charge the same amount.'

1

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

$$.30 - .30$$ $$.20 \cdot .86$$
$$.30 = .89$$ $$20 \cdot 86$$

$$.35 + (.12 \cdot 9)$$ $$.21 \angle (.14 \cdot 9)$$

$$.35 + 1.08$$

$$= 1.43 \ 10 \text{min} \ \text{Natl}$$ $$= 1.47 \ 10 \text{min} \ \text{Dial Direct}$$

[Correctly solves for ten minute costs using appropriate equations |

---

*The response **does** not include*
-Comparison of cost before 8 (or 10) minutes
*--**Solution** indicating that 8 minutes is when each*
  *company **charges** the same amount*
*-Recommendation of National **Telex***

---

*The response minimally addresses **the performance** event*
*-Communicates **few** process components*

SESSION 2

Go on

Telephone Rates

Directions

Show all of *your* work and write your answers directly in this booklet

1 John and his family recently moved. His family asked him to help recommend a telephone company that offers the least expensive longdistance rates.

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Session 2

1

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., and when each company would charge the same amount.

> *The response minimally **addresses the performance event***
> *—**Communicates few** process components*

> *The response **does** not include*
> *—**Appropriate** equations **for finding** the cost **of phone** calls*
> *-Comparison of cost before 8 (or 10) minutes*
> *—**Solution indicating** that 8 minutes is when each company charges the same amount*

Nat'l tel ek
_____

1.43 weekend (10 MIN.)

(first .35¢ add. 12¢)

> *Student gives correct 10 minute cost for National Telex*

Dial-Direct, INC
_____

7.40 weekend (10 MIN)

(first 20¢ add. 13.4¢)

Dial-Direct, INC

> *Writes appropriate recommendation based on calculations*

> *The response indicates lack of understanding*
> *—Incorrectly calculates 10 minute cost at Dial-Direct*
> *—states "20 + 13.4" rather than 21 + 14*

78

SESSION 2

Telephone Rates

Directions

Show all of your work and write your answers directly in this booklet.

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79

Session 2

1

.John's family makes most of their longdistance calls on the weekends, and each call averages 10 minutes.

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National Telex		Dial-Direct, Inc.	
First min.	add. min.	first min	add min
daytime	4.60	1.80	3.00	2.00
evening	4.40	1.50	2.40	1.40
kind	3.50	1.20	2.30	1.30

$17.00 $12.40

Incorrectly calculates rates —multiplies 10 minutes by .46

Table indicates no understanding of calculating cost *of phone calls*
—4.60 + 4.40 + 3.50 + 1.80 + 1.50 + 1.20 = 17.00
—3.00 + 2.40 + 2.30 + 2.00 + 1.40 + 1.30 = 12.40

20% x 3.00 = .60

30% x 3.00 = .90   3.80
                   - .60
                   ─────
3.80   2.40
- .90
─────
2.30

Dial

Does not **indicate** when the costs would *be the same*

80

Work indicates no mathematical understanding of *the task*

SESSION 2

8

The equator of a planet is defined as its circumference drawn perpendicular to its axis of rotation.

Equator

If the radius of Mars is 2100 miies, what is the length of its equator? Provide the work that shows how you arrived at your answer:

$$C = 2 \pi r$$

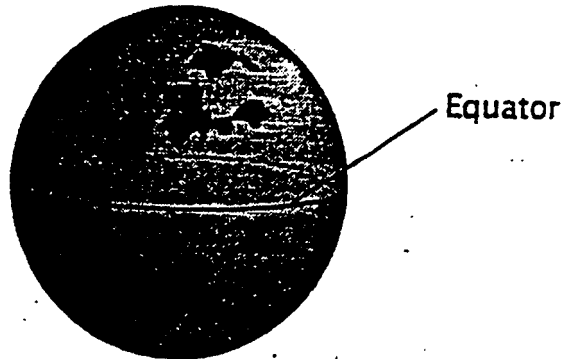$$C = 2 \times 3.14 \times 2100$$

$$C = 13188$$

13188 miles

Correct answer

Correct process - 2πr

Exemplary Response

82

SESSION 2

8

The equator of a planet is defined as its circumference drawn perpendicular to its axis of rotation.
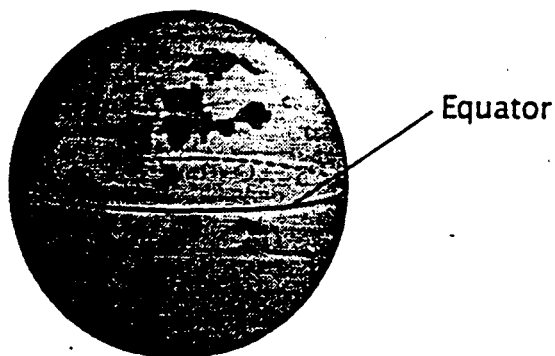
Equator

If the radius of Mars is 2100 miles, what is the length of its equator? Provide the work that shows how you arrived at your answer.
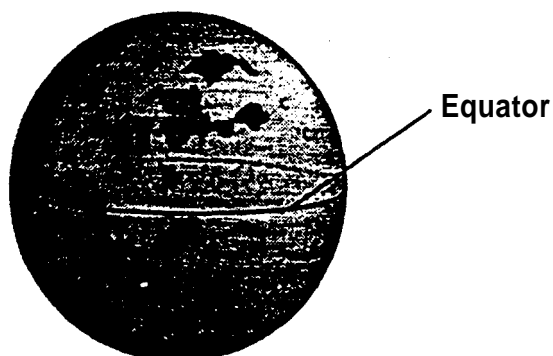
~~13,298.672 miles~~

13,194.68915 miles

Correct answer with π
extended to 3.141592654

No process shown

83

SESSION 2

8 | The equator of a planet is defined as its circumference drawn perpendicular to its axis of rotation.

Equator

If the radius of Mars is 2100 miies, what is the length of its equator? Provide the work that shows how you arrived at your answer.,

$$\theta = r^2$$

$$r = 2100 + 2100$$

*Incorrect process
—writes r² and computes 2r*

$$\theta = 4200 \text{ equator}$$

Incorrect answer

84

SESSION 2

9

About 70% of Earth's surface is covered with water. If the radius of Earth is approximately 4000 miles, approximately how many square miles of its surface are landmasses? Provide the work that shows how you arrived at your answer.

(Surface Area = $4\pi r^2$)

4π 160 00,000

(12.56)(10,000,000

2,009,600,008 × 0.3 =

602,88,000 square miles are landmasses.

Correct and complete process —student shows $4\pi r^2$ multiplied by 30%

Correct answer

Exemplary Response

SESSION 2

9

About 70% of Earth's surface is covered with water. If the radius of Earth is approximately 4000 miles, approximately how many square miles of its surface are landmasses? Provide the work that shows how you arrived at your answer.

(Surface Area = $4\pi r^2$)

$4\pi 4000^2$

Incomplete process

$-4\pi\ 4000^2$ *is not sufficient for the process component*

602880000

Correct answer

86

Session 2

Go On

9

About 70% of Earth's surface is covered with water. If the radius of Earth is approximately 4000 miles, approximatefy how many square miles of its surface are landmasses? Provide the work that shows how you arrived at your answer.

(Surface Area = $4\pi r^2$)

$$201061929.8$$

| Incorrect answer |

| No process shown |

87

— *Go C*

10

Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.

3 min 20 sec

200 sec

Shows one half of 6 minutes 40 seconds and converts to 200 seconds

Correctly calculates 186,000 miles × 200 seconds

186000

× 200
―――――――
37200000 ≈ 3.72 × 10^7 mi.

Correct answer *expressed in* **scientific** notation

Exemplary Response

88

Go

Session 2

10

Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.

Correct and complete process
—converts 6 minutes 40 seconds to 400 seconds
—correctly calculates miles

$(6 \times 60) + 40 = 400$ seconds

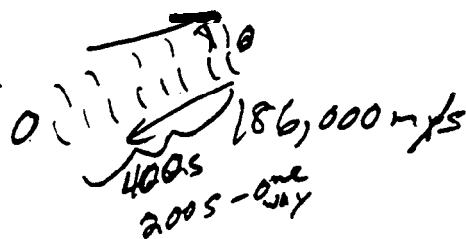$186,000 \times \left[\frac{1}{2}(400)\right] = d$

$37,200,000$ miles

Correct answer not expressed in scientific notation

89

Go C

10

Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.

$V = 186,000 \, m/s$
$t = 200 \, s$
$d = ?$

186,000 m/s

400 s
200 s - one way

$V = d/t$
$186000 = d/200$
$d = 3,200,000$

$$\boxed{39,200,000 \, mi}$$

$$\boxed{3.92 \times 10^7}$$

90

Ga

10

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$6 \times 60 = 360 + 40$ 400 sec

$186,000$
$\times 400$
$2 \overline{)74,400,000}$

37.200000

$37,200,000$
$2\overline{)74,400,000}$
-6
14
$-$
04
4

37.2×10^6

Correct & complete process I

Correct answer

Answer expressed in
incorrect scientific notation

10

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$$\frac{186000 \text{ m}}{1 \text{ s}} = \frac{6 \text{ m}}{46 \text{ s}} \qquad \frac{6 \text{ m}}{} \cdot \frac{60 \text{ s}}{1}$$

$$360 \text{ s} + 40 \text{ s} = 400 \text{ s}$$

$$\frac{186000}{1 \text{ s}} = \frac{x}{400 \text{ s}}$$

Incorrect process
multiplies 400 seconds
× 186,000 miles   I

$$= 74400000$$

Incorrect answer

$$7.44 \times 10^{7}$$

*Answer correctly expressed in scientific **notation***

92

10

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37200000 miles

| Correct answer |

| No process shown |

| Answer not expressed in scientific notation |

SESSION 2   177519
                             93

Go On

| 10 |

Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.

186,000 miles per sec
6 minutes
40 sec

186,000 × 6 × 40

Incorrect process

No correct answer
No answer expressed
in scientific notation

94

SESSION 2